"Best if Used By . . ." How Freshness Dating Influences Food Acceptance

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ABSTRACT: A recent variation of expiration dating is freshness dating (i.e., "best if used by"). This research investigates how freshness dating influences the taste acceptance of a refrigerated product. Sensory tests of 36 panelists show two key findings. First, freshness dating influences the acceptability of products in a discontinuous or nonlinear manner. Second, it does so because it influences perceptions of freshness and of healthfulness, not of safety. As a product approaches its "best if used by" date, there may be more for a manufacturer to lose than to gain by having decided to use "freshness dating" in the first place.

Keywords: freshness, dairy, yogurt, freshness dating, expiration date, food safety, sensory evaluation, taste acceptance

Introduction

Concerns with food safety have lead to expiration dating on foods. A recent variation of expiration dating is freshness dating (that is, "best if used by" dating), and it appears to be used by some as an implicit guarantee of food quality. Indeed, there is a basis for such assumptions. Taste perceptions are impressionable to the point where a person's taste expectations can have a sizable impact on their sensory evaluation of a food (Schifferstein and others 1999). For instance, labeling can lead people to taste labeled ingredients, such as soy, that are not present (Wansink and Park 2002), and to denigrate the taste evaluations of food they believe to be fat free (Bowen and others 1992; Tuorila and others 1994; Bowen and others 2003). Much of this work leads one to believe that our taste evaluations related to perceived freshness may also be suggestible.

Some leading packaged goods companies have begun to use "freshness," "born on," or "best if used by" dating. In most cases, this appears to be done less for food safety reasons than for quality assurance or even marketing reasons (Wansink 2005). Given what has been found in other labeling contexts (Wansink and others 2004), it would appear that there are also important taste evaluation implications of this.

A small change in freshness is difficult for most people to assess (Cardello and Schutz 2003). Ironically, foods that are minimally processed (such as by high pressure or pulsed electric fields) are rated as less fresh than refrigerated or frozen foods. As Cardello (1995) notes, food quality is typically measured using objective indexes related to nutrition, microbiological, or physicochemical characteristics of food. In reality, evaluations of food quality are consumer-based and are subject to the same context issues and expectations as other perceptions (Mela 1999; Rozin and Tuorila 1993; Cardello and others 2000). This is not to say, however, that people are not initially biased by such objective indexes or information. It only means that their final evaluation lies

somewhere between where it would be without information and where it would be with such information (Cardello and Sawyer 1992).

One robust finding in food evaluation research is that people generally taste what they expect they will taste (Wansink 2003). That is, their prior expectations before eating a food serve to anchor their posterior evaluation (Wansink and Park 2002). If they know what to expect—the taste of sweetness, or the taste of soy—they can become hyper sensitive to these cues and end up being overly influenced by them. Whereas such evaluations can backlash, they need to be in extreme contrast to expectations, and this rarely occurs in the contexts in which commercial food is evaluated (Wansink and others 2004; Tuorila and others 1998).

In general, we expect that freshness labeling will influence the taste evaluation of foods. What is not known, however, is whether this is a continuous function or a discontinuous function. Biologically, it is generally thought any affect on freshness would slowly denigrate its acceptability in the form of a negative exponential function. A consumer's view may be more binary. That is, people may think of foods as either fresh or not fresh. This would mean that the difference between 30 d until expiration and 10 d until expiration would be less significant than that between 1 d before and 1 d after expiration.

A second empirical question of interest is how freshness dating will influence taste and acceptability. Does it do so because it first has a referred impact on either evaluations of freshness, healthfulness, safety, or risk? It is not clear, at this point, which of these will be the strongest drivers of overall acceptability.

Materials and Methods

Thirty-six consumers were involved in a taste panel of different types of yogurts (for example, Vickers 1993; Kahkonen and others 1997) at the U.S. Army Natick Soldier Center. These individuals were staff and secretaries who were recruited as part of what they believed was a taste perception panel. In exchanges for their time, they were given coffee and snacks. Participants ranged in age from 25 to 62, and 61% were female.

The study involved a within-subject design where each person was given a total of five items to taste—two of which were test (or target) items and three distracter (or filler) items. Experimental designs that embed test items among distracter items are common

Table 1 – How freshness dating influences food acceptance (mean ± standard deviation)

	Pre-expiration		Postexpiration		F-test d.f. = 3.97
	30 d before expiration	1 d before expiration	1 d past expiration	30 d past expiration	
Acceptable	7.58 ± 1.13	6.84 ± 1.52	6.60 ± 1.33	6.68 ± 1.23	3.29* (P = 0.024)
Healthful[a]	7.55 ± 1.13	6.93 ± 1.63	6.34 ± 1.53	6.46 ± 1.63	3.083* (P = 0.031)
Fresh[a]	7.75 ± 0.92	6.51 ± 1.90	5.93 ± 1.53	5.94 ± 1.98	5.99** (P = 0.001)
Risky[a]	2.13 ± 1.53	2.67 ± 1.78	3.01 ± 2.10	3.06 ± 2.06	1.15 (P = 0.331)
Safe[a]	7.55 ± 2.14	7.15 ± 1.87	6.75 ± 2.02	6.73 ± 2.07	0.87 (P = 0.46)

[a]Rated on a 9-Point scale (e.g., 1 = not very healthy; 9 = very healthy).
*$P < 0.05$; **$P < 0.01$.

in marketing-related studies when the goal is to avoid an artificially direct comparisons between products (Sudman and Wansink 2002). The two test (or target) items were samples of unflavored commercially available yogurts, and the other three flavored samples intended to discourage a direct focus on the sensory characteristics of the two target yogurts. Panelists were given 4 oz of commercial-quality yogurt that was served at 44 °F in 8 oz plastic cups and plastic spoons.

Each sample (including the three flavored distracter yogurts) was identified with freshness dating that indicated that it was either 1 mo from expiration (June 1), 1 d from expiration (May 1), 1 d past expiration (April 29), or 1 mo past expiration (March 31), the fifth sample had no expiration date. The study was scheduled on a specific day (April 30) so that each of the observations was symmetrically balanced (±30 d and ±1 d) yet fell in different months (March, April, May, and June), thus, being salient to consumers. Each individual was given all five items, each having one of the different freshness conditions associated with it. These freshness conditions were rotated across the two yogurts, and their order was systematically rotated among the distracter products. No mention was made of the sample's date other than a small 14-point font label affixed to the sample's container. In reality, both yogurt samples were equally fresh and were more than 30 d ahead of their actual expiration date.

Each individual was asked to rate the degree to which the two target yogurts were acceptable, fresh, safe, healthful, and risky. This was done on an interactive computer format using sliding 9-point scales (e.g., 1 = Not Very Fresh; 9 = Very Fresh). Following the study, the participants were debriefed on the purpose of the study.

Analyses of those evaluations involving the four freshness dating conditions were conducted using ANOVA and regressions (SPSS 11.0). The results were consistent across the order of presentation, the product, and the respondent, and the data were aggregated, and these factors were accounted for in the analyses as covariates.

Results

As the freshness date nears expiration, there was a decreased acceptance ($F_{3,97}$ = 3.29, P = 0.024) of the food, as well as decreased perceptions of its healthfulness ($F_{3,97}$ = 3.08, P = 0.031) and of its freshness ($F_{3,97}$ = 5.99, $P < 0.001$). Table 1 shows that this change in freshness dating, however, did not have a significant impact on the risk associated with the food ($F_{3,97}$ = 1.15, $P > 0.20$), or with its perceived safety ($F_{3,97}$ = 0.87, $P > 0.20$).

Furthermore, there is a precipitous decline in perceptions of a food the day after it exceeds its freshness dating. Figure 1 illustrates that perceptions of the acceptance, healthfulness, freshness, and safety of a food take a marked decline the day after a food is believed to expire. The biggest decline in perceptions are between foods believed to be 30 d fresh and 1 d fresh. There appears to be a benefit to freshness dating in that things that are more fresh are evaluated as better than those only 1 d fresh.

Was this difference driven by fresh products being perceived as more fresh than the control or nonfresh products being perceived as less fresh? In this study, a product labeled as fresh was not rated as significantly more acceptable than one that was unlabeled (7.03, s.d. = 1.21). It was clear, however, that a product that was even 1 d past being dated as fresh was significantly denigrated in its acceptability. This same basic pattern can also be found with measures of freshness (6.55, s.d. = 1.30), healthfulness (6.69, s.d. = 1.46), risk (2.40, s.d. = 1.81), and safety 7.33, s.d. = 1.36). When people were not given any information about the expiration dates, they rated the samples as being somewhere between that of the samples they had believed were 30 d fresh and 1 d fresh.

A second objective of the study was to explore the process by which freshness dating influences the general acceptance of a product. That is, does it do so because it directly influences perceptions of freshness, perceptions of healthfulness, or perceptions of safety? Assuming that these perceptions are formed with similar degrees of confidence by the participants, regression analyses should reflect their relative influence.

These regression analyses indicated that impact of a freshness label can be traced through the impact it has on perceptions of freshness and on the impact it has on perceptions of healthfulness. While a regression of the label condition on acceptance was statistically significant (P = 0.041), this became insignificant when either freshness was included in the regression (Model 3 of Table 2) or when healthfulness was included (Model 4). When both perceptions of freshness and of healthfulness were included, they accounted for 42% of the variance in acceptance ratings, and their P-values were, respectively, $P < 0.001$ and $P < 0.05$. This indicates that the impact that labeling has on acceptance is mediated by these two perceptions, more than that of safety or risk. This general relationship is illustrated in Figure 2, which illustrates that freshness labeling is correlated with perceptions of freshness and healthfulness, which are in turn correlated with food acceptance. Freshness labeling has no correlation with one's perceptions of safety and risk.
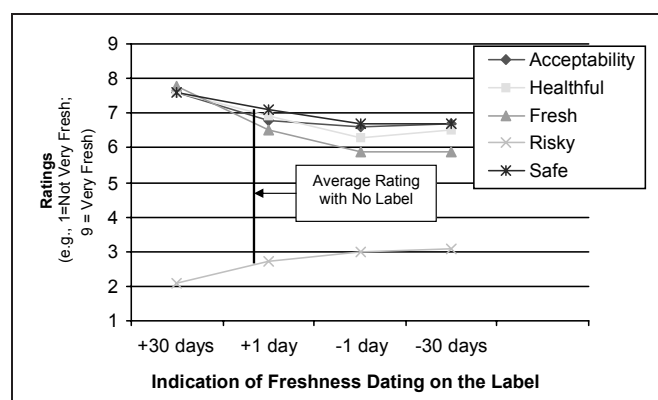

Figure 1 – How freshness dating influences food acceptance

Table 2—Regressions indicate freshness drives food acceptance (standardized regression coefficients; p-values in parentheses).

Model	Freshness	Healthfulness	Label	R^2
Model 1:				
freshness	0.41**	0.26*	0.03	0.42
healthfulness	(0.00)	(0.02)	(0.70)	
label				
Model 2:				
freshness	0.42**	0.26*	-	0.42
healthfulness	(.00)	(0.02)		
Model 3:				
freshness	0.62**	-	0.07	0.39
label	(0.00)		(0.77)	
Model 4:				
healthfulness	-	0.57**	.08	0.35
label		(0.00)	(0.28)	

*$P < 0.05$; **$P < 0.01$.

Discussion

While food safety is a concern to consumers, there has been little evidence prior to this study as to how freshness dating might influence panelists' taste evaluation and acceptance of a food. This study shows how "fresh if used by" dating influences acceptability and taste perceptions. The negative perceptions engendered by expired dates had a negative impact on one's taste evaluation and acceptance. This diminished over the range of unexpired freshness, and then dropped after the point of expiration.

The second key finding of this research is the process by which freshness dating impacted acceptability. Freshness dating simply influences acceptability because it influences perceptions of freshness itself, and to a lesser extent, perceptions of its healthfulness. It appears that food safety concerns are less of a driver in acceptance—in this study—than is freshness.

Implications

Manufacturers need to realize that freshness ratings may not only influence *whether* a person buys a food, but they can also influence what a person thinks of a food after it has been bought. There are key implications to freshness dating. In this study, a product labeled as fresh was not rated as significantly more acceptable than one that was unlabeled. It was clear, however, that a product that was even 1 d past being dated as fresh was significantly denigrated in its acceptability.

Figure 2—How freshness labeling correlates with mediators of food acceptance (correlations between constructs) *$P < 0.05$ **$P < 0.01$

An important warning to companies is that as a food approaches its "freshness date, there may be more to lose than to gain from "freshness dating." Unless freshness dating is a source of positioning, as it recently appears to be with soft drinks and beers, such dating appears more likely to hurt than to help a product. Interestingly, however, even when it is used, the freshness labeling is often only subtly noted on the packaging (Wansink and Cheney 2005). For many consumer segments, this offers the positioning advantages of advertising, without the disadvantages that might occur if it were salient or more obvious (Wansink and others 2004).

The regressions in this study indicate that safety and risk had little to do with one's acceptability of a dated food. Instead, all of the acceptability appeared to be centered in the implications this had for how fresh and healthful the food is perceived. This is important because it indicates that efforts to use freshness dating to connote safety or risk would be misdirected. In this study, freshness dating only appears to connote freshness and health. To extend this to anything safety-related might be too risky because it would raise an issue that is not salient. In doing so, it could arouse suspicion or unwanted concern in consumers.

Limitations and future research

It is interesting to note that as an expiration date passes, it influences the perception of healthfulness and freshness, but not that of risk and safety. One reason this might have occurred is that these products were presented to people in a controlled sensory lab, and most people may have simply assumed (because of liability reasons) that these samples would be safe to consume. It may be that products purchased off the shelf, or those given in a less controlled environment may generate more extreme views of risk and safety. It may also be that such foods would not be consumed to begin with.

In addition, only one operationalization of freshness was used here. There are a number of other operationalizations that can connote different degrees of concern about safety. For instance, whereas a freshness label can indicate that there are not serious safety issues to consuming a dated product, an expiration date might raise such concerns.

Future work can examine how different operationalizations of freshness influence sensory tests. This would be an opportunity to field test different levels of freshness labeling. One's own refrigerator is a place where field tests of freshness and taste are conducted every day. The consequences can be of dramatic relevance when moving acceptability from the lab to the field.

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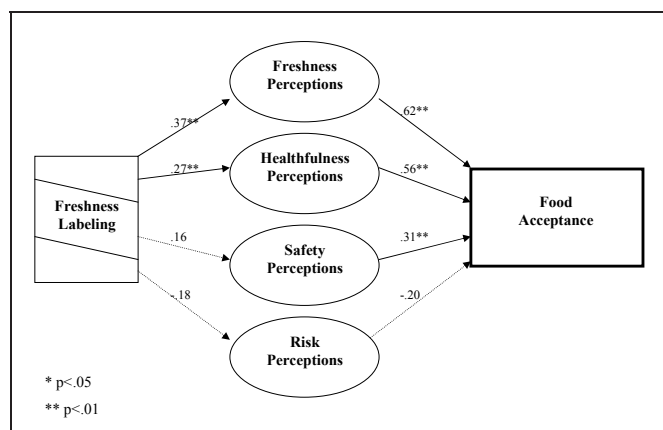Mela DJ. 1999. Food choice and intake: the human factor. Proceedings of the Nutrition Society 58(3):513–21.

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